

REMARKS

Amendments to the Claims

Applicants have carefully considered the rejections raised in the Final Action dated December 15, 2005. As a result, the claims have been amended to comply with the Examiner's requirements as outlined herein below. A one month extension was previously filed to extend the response period to April 17, 2006 and a second month extension was submitted May 5, 2006. Payment for the third month extension of time is submitted herewith together with a Request for Continued Examination. This response includes amendments previously presented in the non-entered responses to the Final Office Action as well as additional amendments to positively recite the structure of the apparatus and to amend the specification to provide antecedent basis for the claim language.

The claims have been amended to more particularly point out and claim the present invention. Particularly, the claims have been amended to recite that the **high voltage electrode is a pin electrode** whereas the **ground electrode is a surface electrode** wherein the pin-to-surface electrode configuration is such that the relative surface areas prevent arcing in the area of the ground surface electrode. Withdrawn claims 13-30 and 43-47 which depend from claim 1 have also been amended. Claims 30-42 have been cancelled without prejudice. It is believed the remaining claims should now be considered on the merits and allowed.

The Use of the Term "Ground Surface Electrode" and the Meaning Thereof Are Not New Matter

The use of "surface" to further define the ground electrodes of the present invention is clearly taught in the application as originally filed. By way of example, beginning at line 6 of page 10, it is stated that "In the present invention, a ground electrode with a large surface area is employed to make a pin-to-surface configuration." Further, please see the discussion with respect to the formula on page 10 to calculate the breakdown voltage of air between a pin and a grounded flat surface, that is, a grounded surface electrode. It should be also noted that, at the top of page 13 of the application, there is a difference between the pin-to-surface characteristics of the present invention and the pin-to-pin arrangements of the prior art. With the present invention, a much higher voltage can be imparted to the charging pin without causing sparks. See page 13, beginning at line 8.

In the embodiment of the invention shown in Fig. 3, it is also described that it is important that the ground electrode 46 is a conically shaped surface wherein care is taken to ensure that there are no sharp points or edges on the surface thereof in order to prevent points of concentration for the electric field lines that will result in arc discharging. See lines 1-8 of page 14 of the specification.

The shape of the ground electrode of the present invention may have any shape, see line 1 of page 16, and is described as being cylindrical at 10, conical at 46, and as flat planar at 62. What is clear from the specification is that the ground electrode must be conducting with respect to the larger surface thereof as compared to the pin configuration of the high voltage electrode and that sharp edges or points of a ground electrode are not exposed to any electric field lines. See page 16, lines 5-10.

In view of the foregoing, the term "surface" has been added at several areas in the specification to provide antecedent basis for the use of the term in the claims and no new matter has been added as it is clear that the ground electrodes of the invention are conductive from larger surface areas and not from points of concentration.

Patentability of the Claims Over the Cited References

Claims 1-4 have been rejected under 35 U.S.C. § 102(b) as being anticipated by the reference United States Patent No. 4,805,069 issued to Nagasaka et al. Reconsideration of the grounds for rejection under 35 U.S.C. § 102(b) is respectfully solicited for the following reasons.

The Examiner has re-asserted the rejections listed in the previous two Examiner's Reports and again in the Advisory Actions issued in response to the previous Response to Final Office Action filed January 18, 2006 and Response filed May 5, 2006, neither of which have been entered on the record. The Examiner has taken the position that "in their arguments that Nagasaki teaches 'pin-to-pin' electrode configurations they do not discuss the disclosure of Nagasaki related to the embodiment shown in Figure 3 which is the embodiment that the Examiner has consistently relied upon as prior art under 35 U.S.C. 102(b)."

The Nagasaki disclosure related to Figure 3 is in column 6, lines 25 to column 7, line 10. The description of this embodiment is very similar and congruent with the discussion of the embodiments of Figures 1, 2, 4, 5 and 7. Specifically, line 30-35 of column 6 refers to:

"a thin corona discharge electrode so as to operate as a desired polarity **plasma electrode 3**, and a thick corona discharge electrode opposed to that

plasma electrode 3 is provided on an outer peripheral surface of the tubular passage 2 so as to operate as an opposite polarity ***plasma electrode 4***.

There can be no doubt from this description that the embodiment of Figure 3 is also teaching a “pin-to-pin” configuration, and not a pin-to-surface electrode configuration as asserted by the Examiner. This is further reinforced by the disclosure in column 6, lines 42 to 49 where it is disclosed:

“...to keep the ***tip end of the opposite polarity electrode plasma electrode 4*** always clean, hence ...where mainly a desired polarity ionic current 6 drawn from the ***tip end of the desired polarity plasma electrode 3*** exists...” which once again reinforces the concept of the “pin-to-pin” configuration. It is noted further that the tips of both electrodes are kept clean because this is where the plasma is formed, at the ***tips of both pin electrodes***.

As discussed in the previous responses, and particularly applied to the embodiment shown in Figure 3 of Nagasaki, both electrodes 3 and 4 shown in Figure 3 fall within the category of “pin-to-pin electrode configuration” while amended claim 1 now positively recites the ground electrode is a surface electrode such that a “pin-to-surface electrode configuration” is created so as to insure that the ground surface electrode has a second conducting surface area that is greater than the first surface area of the pin electrode in order to prevent arcing in the vicinity of the ground surface electrode.

This “pin-to-pin electrode configuration” taught by Nagasaki et al. gives a very different result from the “pin-to-surface electrode configuration” of the present claim 1. Specifically, Nagasaki et al. makes very clear that with the pin-to-pin configuration, ***a plasma or arc discharge is formed at the tips of both electrodes*** based on the above-noted exerts from column 6 of Nagasaki.

Therefore, Applicants respectfully assert that in fact Nagasaki clearly teaches an arc discharge formed in the vicinity of both electrodes of the

embodiment of Figure 3 and thus arc discharging must in fact be present at both pin electrodes, which is clearly the desired result in the Nagasaki patent. The purpose of the plasma pin electrode 4 in Nagasaki being thicker than the plasma pin electrode 3 is to be able to give a smaller ionic current at the plasma pin electrode 4 than that produced at plasma pin electrode 3, (column 6, lines 49 to 53), and since the plasma must be formed at both pin electrodes in Nagasaki, the surface area difference must be such that plasma is still formed in the vicinity of the thicker electrode, unlike in present claim 1 of the present application wherein the ground electrode is a surface electrode which in preferred embodiments may be in a form of one or more cylindrical structures cones or planar surfaces so that a difference in surface area is large enough to prevent plasma formation in the vicinity of the greater surface area ground surface electrode.

Thus In contrast, the “pin-to-surface electrode configuration” of present claim 1 does not produce a plasma at the ground electrode as recited in claim 1 , and further, the purpose of the pin-to-surface electrode configuration of present claim 1 is precisely to eliminate arching or plasma formation in the vicinity of the **higher surface area ground surface electrode**. Therefore, Applicants assert that the embodiment shown in Figure 3 (in addition to all the others) in Nagasaki teach away from present claim 1.

In view of these quite distinct differences, Applicants respectfully submit the subject matter of claims 1 to 4 is not disclosed in Nagasaki or any of the other cited references.

In view of the foregoing, reconsideration and withdrawal of the rejections of claims 1 to 4 is respectfully solicited and favorable consideration and allowance of claims 1 to 4 is requested. Applicants acknowledge that the Examiner has indicated claims 5-12 recite patentable subject matter.

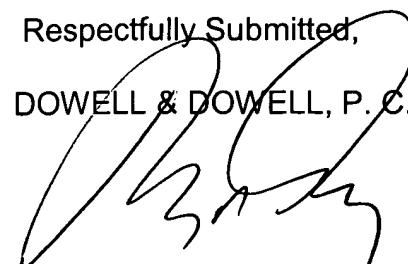
Also, in view of the allowability of generic claims, it is requested that the withdrawn claims now be considered on the merits as each of the non-elected claims is dependent directly or indirectly from claim 1. Consideration of claims 13-30 and 37-42 is thus respectfully solicited.

It is believed that this response places this application in condition for formal allowance. No new issues are being raised. The functionality of the electrode configuration of the present invention had been stated in the claims, however, the ground electrode is now specifically and structurally set forth as being a surface electrode of which the conducting surface area is sufficiently larger than a conducting area of the high power pin electrodes to thereby prevent arc discharging near the ground surface electrode and to further prevent curing on the ground surface electrode. No such electrode configuration is shown or taught in the cited reference.

Should the Examiner have any questions regarding the allowability of the claims with respect to the art, it would be appreciated if the Examiner would contact the undersigned attorney-of-record at the telephone number shown below for further expediting the prosecution of the application.

This response is being filed concurrently with a Request for Continued Examination and the third month extension of time.

Respectfully Submitted,
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